about 1000 A.D. Collateral evidence consists mainly in the references by other writers to the events recorded by the sagas, which, it is plain, were regarded as historical narratives.

The numerous vague rumours of a world in the west, as embodied in strange maps and stranger stories, have little bearing on the relatively precise and plain tales of the Norse sea-kings. Those tales which, where not distorted by later fancy, are straightforward as a sailor's log, must be checked by reference to the geographical data recorded in them. This is the most valuable part of the task essayed by Mr. Babcock in his interesting and well-written volume. He is not the first to make the attempt, but the originality and the strength of his attack lie in his reconstruction of the geographical conditions as they probably were nine hundred years ago. Then the seaboard north of the Gulf of Maine was lower than now, whereas south of that point it was higher. The change, which is still in progress, is due to the oscillation of the earth's crust initiated by the withdrawal of the great ice-sheet. By taking this movement into consideration, Mr. Babcock has been able to identify with much plausibility the features and localities mentioned in the sagas.

Let us take only one point in illustration. Karlsefni and his wife Gudrid on their southward voyage saw to the starboard "a bleak coast, with long and sandy shores . . . they called them Wonder Strands, because they were so long to sail by." The interminable sand-dunes of New Jersey and Maryland supply a modern parallel to these cheerless "Furdustrandir," but the voyagers cannot have been further south than Nova Scotia, and no such wonder-strands are found there now. "Conceive," however, says Mr. Babcock, "the Nova Scotia seaboard lowered by the 25 feet or more of its present height, that is, brought down to water-level and dipped a little under—with slight narrowing of the peninsula in its mainland part, and partial obliteration of the eastern side of the now hollow insular terminal part called Cape Breton Island—and you will have something not wholly unlike the long strands of New Jersey or the peninsula east of the Chesapeake, only with the hill country much nearer. It was the first introduction of the surprised northern visitors to the characteristic American coast line."

By such ingenious but not unwarranted use of the scientific imagination does Mr. Babcock identify the various localities of the saga, thus confirming its essential accuracy. The vines that gave a name to Wineland are the fox-grapes of to-day and the apparent wheat "self-sown wherever there were hollows," is interpreted as wild rice, still a conspicuous feature.

It is maintained, then, that Leif Ericsson chanced on America circa 1000 A.D., and coasted as far south as New Jersey; that Eric the Red dispatched Thorfinn and Gudrid three years later, as leaders of a large colonising party; that they passed Helluland (Labrador), Markland (Newfoundland), the Wonder-strands (Nova Scotia), and settled near the mouth of Straumfjord (Bay of Fundy), where Gudrid gave birth to Snorri, the first American-born white man. Disappointed in the hard winter, Thorfinn and a party sailed further south about as far as Mount Hope Bay, but were driven back by Indians. After another winter at Straumfjord, all returned to Greenland.

THE IMPERIAL BACTERIOLOGICAL LABORATORY, MUKTESAR, INDIA.[1]

THE Imperial Bacteriological Laboratory, situated at Muktesar in the United Provinces, has been established, and is maintained for the investigation of the diseases of stock in India, and for the preparation of anti-sera and vaccines used for the control of epidemic diseases among animals. The history of the laboratory dates from 1890, when Dr. Lingard was appointed Imperial Bacteriologist, and for some years the work in connection with the diseases of animals in India was carried out at Poona. It was decided, however, to establish a separate institution for this purpose in the hills, and in 1895 a laboratory and a few additional buildings were completed. This first laboratory was destroyed by fire in 1899. The re-building was taken in hand at once, and the present laboratory, much larger than the original structure, was erected and ready for occupation in 1901. The work of the laboratory has increased very rapidly, and it was found necessary to add a wing to the main building four years ago. In addition to the large laboratory there are three smaller buildings for the study of separate diseases, and other buildings for the accommodation of animals, post-mortem examinations, etc., have been added from time to time.

One of the earliest problems to be studied at Muktesar was the preparation of a prophylactic for rinderpest. In 1896 Koch visited Muktesar, and demonstrated his bile method of inoculation against rinderpest. An anti-serum for the disease was first prepared in India by Lingard, and it was first used in field epidemics in 1899, when about 2000 doses were issued. Rinderpest anti-serum is one of the most effective prophylactics known to science, and a striking tribute to its value is to be found in the records of the Muktesar Laboratory. Ten years after its introduction into India half a million doses were issued annually. In 1910 improved methods for the preparation of the serum were discovered, and in the following year a million doses were manufactured. The serum is now supplied to all the provinces of India, to Burma, Ceylon, and the Native States, to the Federated Malay States, and to Egypt. In addition to rinderpest anti-serum, a serum and vaccine for the control of epidemics of hæmorrhagic septicæmia are prepared, as well as a vaccine for black quarter and a serum for anthrax. About 20,000 doses of mallein are issued annually. Pathological specimens are examined, and instruction is given to native veterinary graduates in the practical application of serum and vaccines.

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[1] "A Description of the Imperial Bacteriological Laboratory, Muktesar: its Work and Products." By Major J. D. E. Holmes. (Calcutta: Superintendent Government Printing, 1913.)

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The officers of the laboratory have carried out numerous investigations in connection with animal diseases. Much of the research work deals with the study of rinderpest, and the results of Dr. Lingard and Major Holmes (the present director of the laboratory) in this field have found practical application in the preparation of rinderpest antiserum. Investigations on surra were commenced by Lingard at Poona, and continued by him until 1907, when he retired from the service. Holmes directed his attention to the problem of the treatment of surra in equines, and a method has been discovered which, in his hands, has given 75 per cent. of recoveries. The treatment has been successful in animals experimentally inoculated with the disease, and also in cases in which the disease has been contracted naturally. Various other subjects have been studied, and the results of the investigations have been published in scientific journals in India and Europe.

The problem of dealing with infectious diseases of animals in India presents many difficulties which arise from the somewhat peculiar local conditions. Measures of treatment, segregation, and disinfection cannot be imposed without the permission of each individual owner. Formerly a good deal of opposition to serum inoculation for rinderpest was encountered, but this has now almost disappeared, a result which is largely due to the repeated practical demonstrations of the efficacy of serum inoculation in the control of rinderpest epidemics. In dealing with an outbreak of disease it is essential that the measures adopted shall be free from all danger to the lives of the animals treated, and shall in no way interfere with their work. Under these conditions serum therapy has proved to be the safest and most efficient method of operation. Dead vaccines are also used as a preventive measure in districts where disease is seasonally prevalent. Vaccination by means of living or attenuated organisms is not practised, except in the case of black quarter.

A consideration of the subject matter of this pamphlet, and a study of the thirty full-page illustrations, shows that a successful attempt has been made to deal with a subject of great economic importance, viz., the health and well-being of the stock of a great agricultural country. The rapidity of the progress made, since the establishment of the laboratory some twenty years ago, is remarkable, and especially so when one considers the nature of the difficulties which have been encountered.

Percival Hartley.

PROF. J. H. POYNTING, F.R.S.

On the evening of Monday, March 30, surrounded by his family, John Henry Poynting passed quietly away. A memorial service was held in Birmingham on the Thursday following, and was attended by representatives of many universities and learned societies, including Sir J. J. Thomson, Sir Joseph Larmor, Dr. Glazebrook, Sir William Tilden, Prof. W. M. Hicks, Dr. W. N. Shaw, and of course by many colleagues and councillors of the University in which he occupied a chair, as well as by a large number of private citizens and friends. For he was a man universally beloved.

He was born on September 9, 1852, at Monton, near Manchester, son of the unitarian minister of that place. His first education was at home, but the years 1867 to 1872 he passed at Owens College, Manchester, graduating B.Sc. at the London University, and proceeding, in 1872, to Trinity College, Cambridge, where he was bracketed third wrangler in 1876.

He was then appointed demonstrator at Owens College by Balfour Stewart, and began a life-long friendship with Sir J. J. Thomson, who was at that time a student. In due time Poynting became a fellow of Trinity, and in 1880 was appointed to the professorship of physics at Birmingham, which he held to the day of his death.

The four first professors of the Mason College, which was opened by Huxley in 1880 (who delivered, on this occasion, a notable address, reprinted as the first of his collected essays), were Sir Wm. Tilden, Prof. M. J. M. Hill, Dr. T. W. Bridge, who died a few years ago, and Poynting. In this same year Poynting married Miss M. A. Cropper, daughter of the Rev. J. Cropper, of Stand, near Manchester. In 1887 he received the Sc.D. of Cambridge, and in 1888 the fellowship of the Royal Society. In 1891 the Adams prize was awarded to him, and in 1899 he presided over Section A of the British Association at Dover. This meeting was memorable for the clear discovery of the separate existence of electrons, which was announced to Section A by Sir J. J. Thomson on an occasion when many members of the French Association, meeting simultaneously at Boulogne, had come over for friendly fraternisation.

In 1905 Poynting became president of the Physical Society, and was awarded a Royal medal by the Royal Society "for his researches in physical science, especially in connection with the constant of gravitation and the theories of electrodynamics and radiation." In this brief summary an immense amount of work is referred to. The work for which he is locally best known was his determination of the Newtonian constant of gravitation by the very accurate use of an ordinary balance with an adjustable mass under one or other of the pans—a determination which is popularly called "weighing the earth." His account of it appears in the *Phil. Trans.* for 1891. It is a classical memoir of its kind, and very instructive to the physical student, but the papers on electrodynamics eclipse it in value. These were "communicated" to the Royal Society in 1884 and 1885 respectively, their titles being "On the Transfer of Energy in the Electromagnetic Field," and "On the Connection between Electric Current and the Electric and Magnetic Inductions in the Surrounding Field."

The memoir on the transfer of energy aroused universal attention. The paths by which energy travels from an electromotive source to various

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